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work with that of the other departments, and that the pupils will be brought into contact with real problems and not the mere statements of problems. Nor do I believe that it will ever be practicable in high school mathematics for teachers to take their classes into the laboratories or workshops and there work on a series of experiments so planned as to present the problems which the pupils will then be required to solve. It appears that there are many possibilities along this line that have never been realized, but it does not seem that one of the chief aims in mathematical instruction can best be served in this way. Mathematics consists of a system of knowledge which demands logical thinking for its mastery; and the number and variety of problems that will come up in this laboratory work will not be great enough to give the requisite experience in thinking.

The advent of vocational training into the secondary schools will probably bring about a closer study of the needs of the pupils. They will not be required to take a year and a half of algebra and a course in plane and solid geometry irrespective of the length of time they will likely spend in school or of the vocations for which they are preparing. Efforts are being put forth to make the courses such that if it becomes necessary for the pupils to leave school at the close of any term their work in mathematics will be of such a nature as to be of value to them. The amount and the character of the mathematics for students who are expecting to attend college will likely not be lessened. In the larger industrial centers the tendency will be to widen the scope of subjects, that is, along with the traditional algebra and geometry the most practical parts of trigonometry and a course in applied mathematics summarizing and vitalizing the subjects learned will make up the course. In the agricultural high schools the course in mathematics will likely be shortened and a course in applied arithmetic and courses in algebra and geometry, which emphasize the most practical phases of interest to the farmer, will replace the present courses. The course for the girls in the different schools will also probably be shortened, and the subjects of arithmetic, algebra, and geometry will be treated along with the applications of a kind that will be of most interest and value to them.

The high school in all its courses will probably give more consideration to the special needs of the pupils than to their preparation for college. The colleges will require fifteen units of work with very few limitations. Thus the small schools will be free to offer courses best fitted for the students in their particular localities and at the same time give the training requisite for admission to college.

NOTES AND NEWS.

UNDER THE DIRECTION OF FLORIAN CAJORI.

In H. Weber's *Kleines Lehrbuch der Algebra*, 1912, the same proof of the simplicity of the alternating group of degree n, $n \neq 4$, appears twice, on pages 215 and 373 respectively.

The lectures on recent advances in physics, delivered by Professor Volterra at Clark University in September, 1909, were published in the double number of the *Archiv der Mathematik und Physik* which appeared February 17, 1914.

It is proposed to erect a monument in memory of P. S. Laplace at his birthplace, Beaumont-en-Auge, France. The money to defray the expense is to be raised by international subscription. The firm, M. Gauthier-Villars, Paris, France, has offered to receive subscriptions for this purpose.

The part of the *Encyclopédie des Sciences Mathématiques* dated December 23, 1913, is devoted to Projective Geometry (143 pages) and to Configurations (17 pages). Among the new parts announced in press is the rest of the article on Calculus of Variations, and an article on the Developments of Hydrodynamics. Tribune publique 23 is inserted in the present part.

Florian Cajori, of Colorado College, will attend the Napier Tercentenary Celebration next July in Edinburgh, and will present a historical paper on that occasion. He will spend the summer in Great Britain and later travel on the Continent. In the fall of 1915 he will resume his work at Colorado College.

The January, 1914, issue of the *Irish Journal of Education* contains a further instalment of the Report of the National (American) Committee of Fifteen on Geometry Syllabus, embracing that part of the historical introduction which refers to England. The whole report is to be printed in the *Journal* by permission of the Committee.

Professor L. C. Karpinski, of the University of Michigan, held an Institute on Arithmetic before the Toledo, Ohio, Teachers' Association during the week of March 2–7, 1914. His lectures were mostly to the grade teachers, but one was given to the high school teachers. His underlying purpose was to emphasize the practical side of arithmetic.

The courses in mathematics to be given at the summer session of the University of Michigan, June 26 to August 21, 1914, include plane geometry, solid geometry, elementary algebra, trigonometry, college algebra, analytic geometry, geometry and algebra (teachers' course), calculus (two courses), theory of finance, insurance, and statistics, history of mathematics, differential equations, projective geometry, theory of functions, infinite series and products, the theory of potential, advanced calculus. The members of the regular staff offering these courses are professors BEMAN, MARKLEY, and FORD, assistant professors BRADSHAW and KARPINSKI, and instructors POOR, HILDEBRANDT, FORSYTH, and MILLER.

The following courses in mathematics will be offered during the Summer session of Dartmouth College, July 6 to August 15, 1914: In addition to elementary college courses,—by Professor PITCHER, principles of calculus; by Professor BILL, solid analytic geometry, advanced aspects of elementary geometry (the latter intended primarily for teachers); by Dr. MORGAN, higher geometry, the teaching of elementary algebra.

The University of Illinois announces a course of lectures on General Analysis by Professor Fréchet of the University of Poitiers, France. The course will consist of four lectures per week throughout both semesters of 1914–'15. Professor Fréchet is recognized as one of the leaders in this field of mathematics and through his publications has contributed largely to its literature.

The Illinois chapter of the Society of Sigma Xi held a regular meeting on April 15 at which Mr. A. O. MacGillivray spoke on "Spiders and their spinning work."

The Spring quarter gathering of the Society of Sigma Xi at the University of Chicago was held on Tuesday, May 19. The after-dinner speaker was Dr. Ira Remsen, President *Emeritus* of Johns Hopkins University, whose subject was "Reminiscences of Sylvester and Rowland."

The Harvard University Press announces the early publication of "The Hyperbolic Functions of Complex Variables" by Professor A. E. Kennelly.

Professor David Eugene Smith, of the Teachers College, Columbia University, will attend the Napier tercentenary celebration at Edinburgh, next July, and will present a historical paper on that occasion.

Professor H. Andoyer, of the University of Paris, announces that he has completed for somewhat later publication the calculation of tables giving to fifteen decimal places the natural values of the sines, tangents, and secants of angles up to 90 degrees, in steps of ten seconds.

At Columbia University leaves of absence have been granted to Professor T. S. Fiske for the first half year and to Professor H. B. Mitchell for the second half year of 1914–1915.

At a recent meeting of the New York section of the Association of the Teachers of Mathematics of the Middle States and Maryland, addresses were delivered by Professor C. J. Keyser on "The human worth of rigorous thinking" and by Professor H. E. Hawkes on "How can we teach our pupils in geometry to think?"

The Fifty-Second Annual Convention of the National Education Association will be held in St. Paul, Minn., July 4–11, 1914. The meetings of the National Council will begin on Saturday, July 4. Educational Sunday will be observed on July 5, and the general sessions will open on July 6.

In *L'Enseignement Mathematique* for January, 1914, N. Gennimatas proves that a Heronian triangle, that is a triangle such that the area is a rational function of the sides, is always similar to a triangle whose sides may be written in the form: $a = x^2 + y^2$, $b = (1 + y^2)x$, $c = (1 + x)(y^2 - x)$, the area of the latter being equal to cxy.

"Memorabilia Mathematica or the Philomath's Quotation Book" is a volume by Dr. R. E. MORITZ of the University of Washington, just published by the MACMILLAN Company. The following topics are discussed in the twenty-one chapters: definitions and object of mathematics, the nature of mathematics, estimates of mathematics, the value of mathematics, the teaching of mathematics, study and research in mathematics, modern mathematics, the mathematician, mathematics as a fine art, mathematics as a language, mathematics and logic, arithmetic, algebra, geometry, the calculus and allied topics, the fundamental concepts of time and space, paradoxes and curiosities.

In *Science* for April 24, 1914, Professor C. N. Moore, of the University of Cincinnati, calls attention to an address by Professor Thorndike, of Columbia University, before the Cincinnati Schoolmasters' Club in which some sweeping statements in regard to the educational value of mathematics are made. As against these statements, Professor Moore recalls the article of Professor Keyser, head of the department of mathematics at Columbia University, published in *Science* for December 5, 1913, on "The human worth of rigorous thinking." It is well worth while for all friends of mathematics to consider carefully the claims set forth by both of these writers.

On April 14, 1914, there was celebrated at the University of Palermo the thirtieth anniversary of the foundation of the Circolo Matematico of Palermo. On that occasion a gold medal was presented to G. B. Guccia, the founder of the society and of its organ, the *Rendiconti*. As the society is international, the co-operation of mathematicians of all countries was invited. The local committee of arrangements consisted of Professors M. Albeggiani, F. Raffaele, G. Bagnera, G. Pitrè, A. Venturi, M. Gebbia and M. de Franchis.

The interest taken in Italy in the four hundredth anniversary of the birth of Tartaglia is made evident by the notices appearing in the daily press. *La Tribuna* in Rome printed on February 9 a long notice of Tartaglia, written by the engineer V. Tonni-Bazza, who has made a special study of the life and works of the sixteenth century algebraist. Antonio Favaro of the University of Padua has published several articles about Tartaglia in technical journals.

The February issue of *Isis*, the new journal on the history of science, edited by George Sarton and published in Belgium, completes the first volume. It is a substantial volume of 824 pages. The last number contains the following articles on mathematics: "Les tendances actuelles de l'histoire des mathématiques" by the editor, "Le glorie matematiche della Granbretagna" by Gino Loria, "The origin of Cauchy's conceptions of a definite integral and the continuity of a function" by Philip E. B. Jourdain. The international character of the journal is indicated by the fact that the three contributors just named have written in French, Italian and English. A fourth original article is in German, by Ernst Bloch, on "Die chemischen Theorien bei Descartes und den Cartesianern."

The twenty-fifth anniversary of the founding of Teachers College, Columbia University, was celebrated February 21. At the end of the present academic year, the college will place its work, with but one exception, on a graduate basis. According to the *Columbia University Quarterly*, "the normal schools supply the rank and file of teachers of the common schools; the state universities, through their departments of education, are equipping the rank and file of the teachers of the secondary schools. There remains however the preparation of the supervisors and administrators in these fields and the equipping of the teaching staffs of all these professional faculties. It is to these fields, then, that Teachers College prepares to confine itself . . . ."

Beginning with January 1, 1914, the *Zeitschrift für mathematischen und naturwissenschaftlichen Unterricht* is being edited by H. Schotten, W. Lietzmann and E. Grimsehl. Heretofore it was edited by H. Schotten alone. B. G. Teubner continues to publish this journal. In the third number of Vol. 45, W. Lietzmann makes a report on the teaching of the differential and integral calculus in oberrealschulen, realgymnasien and gymnasien at the present time. The calculus is taught in most of these schools, but is developed with less rigor than in university courses. The use of the derivative predominates over that of the differential. There is little fusion of the differential and integral calculus, the latter being taken up only in part or neglected altogether. The introduction of the calculus into these schools is generally looked upon as a step forward, in spite of the lack of coördination of the courses with the university courses. As Klein says, the present is a period of transition. One of the vital questions is the degree of rigor with which the subject should be developed in these schools.

The earlier and wider introduction of the calculus receives attention also in England. In the December, 1913, number of the *Mathematical Gazette,* C. S. Jackson gives the first instalment of a paper, entitled "The Calculus as an item in school mathematics," which he read before the London branch of the Mathematical Association. Twenty-five years ago only a few of the best students took up calculus; skill in manipulation was overemphasized, applications were neglected. More recent demands made by physicists and engineers have led to a cleavage in the modes of initiating boys into the calculus. "The rigorist puts minute logical precision first—the practical man asks us to dwell on the utility of the calculus. Of the two the rigorist, in relation to the schoolboy, is by far the more astray. . . . We as teachers are just learning that you cannot teach people to generalize by throwing ready-made generalizations at them—that a grip on the concrete facts must precede a critical analysis of them—that there is no worse mistake than to jump before you come to the fence." Jackson's aim is expressed by himself as follows: "It is the object of this paper to argue that in broad outline there is one way—one fairly definite sequence—to which the teaching of the subject ought with variations to conform." In the part of his paper thus far published he enters upon a description of the preliminary work.

The following courses in mathematics will be offered at the Summer session of the University of Chicago, June 15 to August 28, 1914: By Professor G. A. BLISS, plane analytic geometry, and metric differential geometry; by Professor D. R. CURTISS, differential calculus, and functions of a complex variable; by Professor L. E. DICKSON, theory of equations, theory of invariants (1st term), and linear algebra (2d term); by Professor KURT LAVES, analytic mechanics, and observatory practice; by Professor A. C. LUNN, geometrical optics, and electron theory of electromagnetism; by Professor C. N. MOORE, college algebra, and integral calculus; by Professor E. H. MOORE, solid analytic geometry (1st term), and integral equations in general analysis (1st term); by Professor F. R. MOULTON, problem of three bodies; by Professor G. W. MYERS, teaching of elementary school mathematics, and teaching of secondary school mathematics; by Professor H. E. SLAUGHT, plane trigonometry, and elliptic integrals; by Professor J. W. A. YOUNG, college geometry, and critical review of secondary mathematics. Also private reading and research in both pure and applied mathematics is conducted for advanced students. The mathematics club, consisting of all instructors and advanced students in mathematics and mathematical astronomy, meets weekly for discussion of research and pedagogic questions.

At the recent meeting of the Ohio Association of Mathematics and Science Teachers, a number of teachers of mathematics discussed the advisability of forming a mathematics section under the Ohio Academy of Sciences. Another suggestion was that the group of teachers concerned petition the council of the American Mathematical Society, of which many of them are members, for permission to organize a Junior Section of the Society for the purpose of conducting meetings at which papers of less formal character and of more direct bearing on mathematical teaching than is usual at regular meetings of the Society could be presented and discussed. Such meetings would be of value both to those who find it too expensive and inconvenient to attend regular meetings of the Society as now constituted, and to those whose interests lie chiefly in the field of mathematical teaching. It was further suggested that notices and reports might be published in the AMERICAN MATHEMATICAL MONTHLY, and that this journal might be made an official organ of such junior sections in case the plan were eventually recognized and approved by the Society.

Erratum.—In Professor Roever's article in the December, 1913, issue, the last sentence at the bottom of page 303 should be modified to read as follows: "This is an element in which a plane through the vertex and perpendicular to the internal bisector of the angle P_1PP_2 (Fig. 3) cuts the conical roof."